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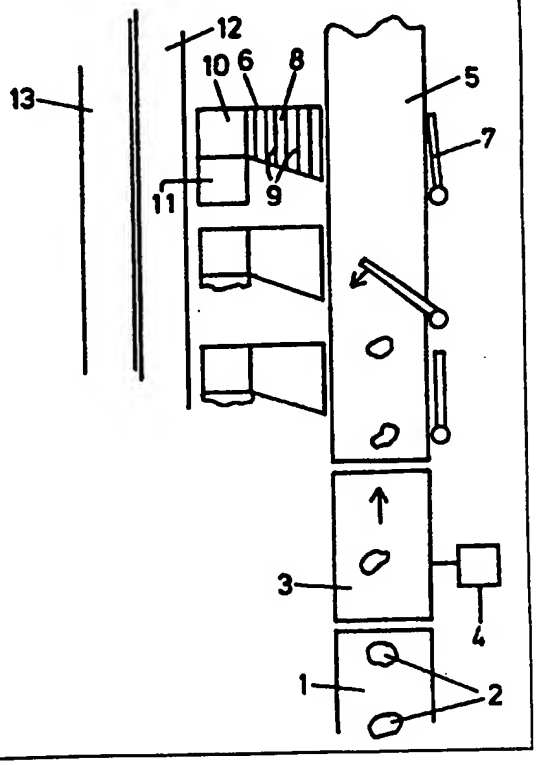
(54) Title: A METHOD AND A SYSTEM FOR HANDLING SLICED FOODSTUFF PRODUCTS FOR PACKAGING IN WEIGHED AND NEATLY ARRANGED CONDITION

(57) Abstract

In order to prepare sales packings of sliced high quality products such as smoked salmon it is common practice to arrange the slices manually in meat imbricated formation on a cardboard carrier plate, whereby the operators may even select particular slices for reaching a desired total weight of the packing. According to the invention it is possible to greatly facilitate this work in using a grader type weighing and portioning machine (3, 4, 5), the receiving stations (6, 10) of which are used as working places for one or more operators, who need not then care about the weight of the collected portions. The receiver stations (6, 10) are designed for the particular purpose, e.g. including means for automatically feeding carrier plates (28) to the stations (6, 10) and means for facilitating the delivery of sticky slices (2) from the receiver area (8) of the carrier plates.



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A method and a system for handling sliced foodstuff products for packaging in weighed and neatly arranged condition.

The present invention relates to a method of building up portions of foodstuff objects orderly arranged in or on package members such as trays or plates to form weight determined portions ready for final packaging, in particular slices of salmon or of other more or less precious materials.

It is known that in direct association with slice cutting machines it is possible to arrange for means operating so as to deliver the consecutively cut slices in groups laid out in imbricated formation on conventional 'salmon boards', which are special cardboard pieces suited to act as carriers for the slices in sales packings completed by a film wrapping making the products visible to the customers. Normally, the equipment is adjusted so as to deliver to the plates a predetermined number of slices, but since - as readily appreciated - the slices will vary in size or at least not be of uniform size through longer periods, the different groups are liable to exhibit different weights, whereby they are almost bound to be weighed and price marked individually.

Another practice is to arrange the slices manually on the plates, whereby it is possible to aim at a fixed weight and thus a fixed price by selecting exposed slices of appropriate size and number, but this, of course, is rather laborious.

The present invention is based on the consideration that it is possible, for one thing, to adapt a known distribution technique to automatize the selection of slices for collection of portions of a desired weight, and, for another thing, to adapt this technique so as to

enable a delivery of the slices or the slice groups directly or practically directly to the single package plates or trays, such that the manual work can be reduced to a neat rearranging of the slices on the plates.

The known technique here referred to is the one practiced by grader or batching systems comprising a feeder conveyor for supplying the objects one by one to a dynamic weighing unit that will weigh the single objects and store the weighing results in a memory and calculating unit. Thereafter the objects are brought further along a sorter conveyor having at one or both sides a row of receiver stations, while also being equipped with selectively actuatable diverter means operable by said memory unit to divert the single objects into selected receiver stations so as to build up therein collected portions of objects amounting to some predetermined total weight. The memorizing/calculating/-controlling unit serves to direct each object into the receiver station best fitted for receiving just that object in order to end up with a complete portion of the prescribed weight, see e.g. GB-2,116,732.

As mentioned below, it may be required to adapt such a sorter system in a special manner in order to make it handle thin slices, but according to the invention a still more important adaptation is arranged for by converting the receiver stations from being just 'receiving stations', in which the single object portions may be collected in a container from which the portions can be let out for further processing in that there is arranged, at each receiver station, means for supporting a package plate or tray member as referred to. The objects may not be delivered particularly neatly to the single receiver stations, but an operator's job will be reduced to provide a neat arrangement of the final group of objects at each single package member, without caring about the weight of the portions. Thereby the operators

will greatly improve their operation capacity.

It should be mentioned that the grading technique has been developed so as to be able to operate at relatively high speed, handling e.g. some 120 objects per minute, and of course it is desirable to actually make use of such a high speed operation. However, this implies that the objects are to be transferred from the sorter conveyor to the receiving stations in a very fast manner, which is well possible in connection with objects conventionally handled by this technique, e.g. chickens of fishes or large pieces thereof. The said diverter means usually consist of a wing or blade member, which, when operationally selected, is swung from a position along one side of the conveyor to a position in which it projects across the conveyor belt, obliquely downstream of the belt and towards the receiver station at the opposite side of the belt. In slow operating systems the objects will then be caused to slide or roll along the oblique wing out to the receiver station by the driving action of the moved belt, but in high speed systems this will not be the general picture of the operation. In that connection it will be required that the wings be actuated so rapidly that they will operate in quite a different manner, viz. by imparting to the objects a dynamic throw-out action, whereby the objects are thrown out to the respective receiver stations.

This is acceptable as long as the objects are solid units which may hit some receiver plate of the receiving station and readily fall down therefrom into a receiver container, but when thin slices are concerned the picture changes completely in that such slices tend to adhere to the surface they are thrown against. Thus, the slices cannot be expected to readily seek down to the bottom area of a receiver station, at which there may be placed a packing plate or tray in accordance with this invention, and for this reason it is important that one

or more operators be available for supervising the factual delivery of the slices to the receiving stations, thus even for scraping off the said adhering slices in order to bring them to the packing plate at the bottom of the station. It is an advantageous measure, therefore, to arrange the receiver stations to be operator attended stations, in which an operator may attend both to the delivery of all received slices to the packing plate and to the neat arrangement of these slices on the packing plate.

These actions may be performed in two steps, viz. first collecting the slices into a well confined group on the packing plate without much or any rearranging, then transferring the plate to a nearby working plate in the receiver station to make the latter reoperative without delay, and then making the rearranging of the slices on the plate. A further possibility could be to collect the slice group on a rigid bottom plate end cause the entire group to be transferred to the packing plate, e.g. in the said working position thereof, whereby the packing plates themselves should not be present in the very receiver means of the stations.

It has been found that the conventional diverter wings can be modified to better suit the present invention. They may well be suited to divert even rather thin slices, but they affect the slices in different ways, causing some slices to be merely scraped or thrown off the belt, while other slices are consecutively turned when hit by the vertical side wall of the wing, such that they are thrown out with their orientation changed. For mere grouping purposes this could be fully acceptable, but in particular as far as smoked salmon is concerned it is desirable to maintain a uniform orientation of the slices presented on the packing plates, in order to expose the same colour on the visible edges of the slices, and the work will be made difficult for the

operators if they shall not only rearrange the slices neatly, but also turn the direction of a large percentage of the slices.

On this background it has been found possible to design the diverter wings in such a manner that practically all slices will be delivered with uniform orientation, viz. such that they will all, with a high degree of safety, be turned by overfolding when diverted by the wings. To this end, the wings are preferably profiled as stated in claim 6, as explained in more detail below. All according to the nature of the slices it may be necessary to seek to adapt the receiving stations for an easy running of the operation. At one extreme, viz. if the slices are hard frozen, they will simply be pushed or thrown off the grader belt, typically with a force depending on whether they are hit by a diverter wing portion having a higher or lower velocity, i.e. whether hit by e.g. the wing tip or a middle wing portion; when the slices are hard and non-sticky, this will not make any big difference, because the slices may be thrown against an outermost wall portion of a receiver container having a hopper shaped bottom portion leading the readily downfalling slices to a relatively narrow bottom area representing the dimentions of the packing plates.

Normally, however, the slices will not be hard frozen or non-sticky, and they will tend to stick to the said outermost container wall portion, if they are thrown against it. Experiments have shown that a possible solution can be to arrange for an outward retraction of these wall portions such that they will only exceptionally be hit by the diverted slices, while using underneath the trajectory of the diverted slices a collector conveyor bringing the downfalling slices down to the said bottom area of the receiver container. However, even such a system presents certain difficulties.

Another attempt to modify the receiver containers

was based on the use of a low-friction plastic material for the container walls, facilitating an easy sliding down of the sticky slices onto the narrow bottom of the receiver container, contrasted to the conventional use of metal walls, but the efficiency of this system, though sufficient for some products, was not found satisfying for the handling of smoked salmon slices at temperatures well above 0°C.

It was found almost unavoidable that some slices would adhere to the catching wall of the receiver container, without readily sliding down, and it was realized that a more effective solution could be based on two different principles, viz. 1) arranging the catching wall portions so as to be slanting downwardly and outwardly, whereby the gravity could assist in liberating the slices from their sticked positions, and 2) arranging for receiver wall areas operable to be tilted upside down or at least through such a substantial angle as to make received slices generally turning downwardly, for facilitating an easy release and downfall thereof. These aspects of the invention, as claimed in claim 9, will be discussed in more detail below.

In the following the invention as a whole will be explained in more detail with reference to the drawing, in which:-

Fig. 1 is a top view of a grader system according to the invention,

Fig. 2 is a sectional view of a diverter wing in such a system, and

Figs. 3-7 are illustrations of a modified and preferred receiver in such a system.

The system shown in Fig. 1 comprises a feeding belt 1 serving to bring mutually separated objects 2 to a weighing belt 3 forming part of a dynamic weighing system connected with a computer 4. Thereafter, the objects 2 are moved further on a conveyor belt 5, along one side

of which there is provided a row of receiver stations 6, while at the other side of this belt there is arranged, correspondingly, a row of diverter wings 7, which, controlled by the computer 4, are operable to be swung inwardly over the belt 5 so as to thereby effect a diversion of weighed objects 2 to any selected station 6. It is indicated by an arrow that the swinging-in of the diverter wings may take place with such a velocity that an object 2 hit by the wing will be directly thrown out towards the selected station 6.

In the embodiment shown in Fig. 1, each station 6 comprises a receiver section 8 made as an outwardly and downwardly slanting roller conveyor with very thin conveyor rollers 9, e.g. only some 5 mm thick, leading down to a collector section 10, next to which there is located a magazine 11 for packing plates or trays. Along the row of stations 6, opposite to the belt 5, there is provided a strip shaped table 12, outside which a take-away conveyor 13 is arranged.

The downwardly slanting roller conveyor 8 will serve to receive all slices thrown off from the belt 5 and guide them down to the section 10, in which they are deposited, optionally assisted by an operator, on a packing plate or tray furnished from the magazine 11. When a portion is completed, e.g. signalled to the operator by way of the computer 4 actuating a signal lamp at the relevant station, the filled plate or tray may be transferred to the table 12 by the operator or by automatic means, and then a new plate or tray can be fed from the magazine 11, enabling a rapid reactuation of the receiver station 6. The operator may then, on the table 12, effect the required rearrangement of the collected slices and thereafter push the packing plate or tray onto the conveyor 13 for delivery thereof to a packing station.

A non-illustrated alternative can be to avoid the

roller conveyor 8 and provide the section 10 as a bottom portion in a hopper like receiver bin placed closer to the belt 5, with outermost upstanding wall portions for catching the slices thrown off from the belt 5, these walls being made of a low friction material and/or with a surface profilation promoting an easy sliding down of the slices caught by these wall portions.

As mentioned, it may be a problem that the wings 7 may cause the slices 2 to be rollingly overfolded rather than just pushed or thrown off the belt 5, whereby the orientation of such slices is changed. After many experiments a rather simple solution to this problem was found, viz. in profiling the wings as shown in Fig. 2. At its lower end the wing 7 is provided with a protruding scraper edge 14 having above and in front of it a protruding root face 14. Even more or less thawn salmon slices may then be displaced on the belt 5 rather than overrolled thereon, at least with highly increased security. The operators may well accept a few turned slices now and then.

The receptacles 6 should have a length in the longitudinal direction of the belt 5 longer than the normal width of a packing plate in order to allow for some spreading of the throw-out form the associated wings 7. Upstanding outer walls should receive the slices not directly hitting the packing plates at the bottom, and the slices should be guided so as to be delivered to the relatively narrow bottom plate, if required with some manual assistance, though as little as possible. As described in connection with Figs. 3-7 it has been found possible to design a receptacle widely fulfilling these requirements.

One such receptacle unit is shown in an exploded view in Fig. 3 and in assembled condition in Fig. 4. The unit has a rear plate portion 16 with obliquely forwardly extending wing plates 18 and with a slightly upwardly

and forwardly inclined orientation. The triangular spaces in front of the wing plates 18 are occupied by separate triangular bottom plates 20 that are slanting slightly downwardly towards each other and each having an upstanding outer plate portion 22 extending closely along the wing plate 18 located therebehind, and a horizontal innermost edge portion 24. Each of the elements 20-24 is pivotally suspended by means of pins 26, whereby they are tiltable from the position shown in Fig. 4, which is also shown in full lines in Fig. 7, to the position shown in dotted lines in Fig. 7.

As apparent from Fig. 4, the horizontal plate edge portion 24 extend parallel to each other with a certain mutual distance, viz. such that they are suited to carry between them a loose bottom plate 28, which, as shown particularly in the top view of Fig. 6, may well extend further outwardly underneath the rear plate 16, the edge portions 24 being correspondingly extended.

Fig. 5 is a cross sectional view of the conveyor 6 with an associated lateral view of a receptacle, in which a bottom plate 28 i shown rested on an edge plate 24.

As slices are received by the receptacle the slices will predominantly be delivered to the bottom plate 28, though also with overlapping to the triangular bottom portions 20. Some slices may be thrown against the wing sides 18,22 and even stick thereto.

When a receptacle has received a complete slice portion the computer 5 will actuate suitable means (not shown) for pivoting the bottom portions 20-24 to the position shown in dotted lines in Fig. 7. A first result of this will be that the plate edges 24 will be withdrawn from the support plate 28, such that this plate will fall down to an underlying, fixed plate portion 30, Fig. 7, while a subsequent result is that slices happening to stick to the plates 20,22 get the opportunity to

fall down therefrom by the associated inward pivoting of these plates. The pivoting make take place at high speed and with an abrupt stop, whereby adhering slices will be thrown off so as to fall down on the top of the slices on the plate 28 as already fallen down. An operator may then take out the plate 28 and manually rearrange the slices neatly thereon. Also, the operator may visually inspect the receptacle and release slices happening to still get stuck thereto. In particular when the slices are still cold the receptacles will be liable to completely empty themselves onto the support plate 28, requiring only sporadic assistance from the operator.

A new support plate 28, also referred to as a packing plate, may thereafter be placed on the plate edges 24 by the operator, once the plate systems 20,22 have been swung back, and the operator may actuate a switch informing the computer of the renewed operability of the receptacle. It is preferred, however, to make use of an automatic feeding of the plates 28 from a magazine 32, Fig. 7, by means of suction cups and an associated movement system. Preferably, use is made of a lateral feeding to the area beneath the opened bottom portions 20 and then a raising to the normal position of the carrier plate 28, which will then be stabilized by a reclosing of the bottom portions 20, as the plate edges 24 will then be brought into position beneath the side edges of the plate 28. Thereafter the suction cups are released and moved back to the magazine.

The inwardly slanting configuration of the upstanding walls will contribute to make the slices less adhering to these walls, as the gravity will seek to loosen the adherence.

Of course, the bottom plate 28 could be a system part, from which the collected slice portions could be transferred to individual packing plates, but it will be appreciated that these plates 28 may perfectly well be

the packing plates themselves. Once the operator has completed the rearrangement of the slices on such a plate, the latter may be delivered e.g. to a conveyor belt for bringing it to a further processing unit or to a final packaging station.

C L A I M S:

1. A method of handling products in the form of foodstuff pieces to be brought together in orderly, weighed portions, e.g. for forming portions of thin slices of smoked salmon in imbricated formation, in or on a packing element such as a carrier tray or plate, characterized in that the products, from a supplied flow of products with the use of a portioning apparatus of the grader type, i.e. whereby the products are brought to pass over a dynamic weighing unit and then out on a sorter path along a row of receiver stations, at which diverter means are provided for transferring the products to the single stations for heaping up products into summation weight determined portions therein, and that in connection with the single receiver stations there is arranged a supply of the said packing elements in such a manner that products arriving at each station can be collected directly on the packing elements or adjacent thereto, or, respectively, in portions that are transferred to the respective packing elements.

2. A method according to claim 1, characterized in that the single receiver stations are utilized as working sites for a manual rearranging of the collected products for a desired orderly layout thereof on the packing elements.

3. A system for use with the method according to claim 1, characterized in being a modified portioning system of the grader type, viz. comprising a dynamic weighing unit for receiving and weighing successively supplied products and an aftercoupled sorter conveyor with diverter means for selectively diverting the weighed products to a row of receiver stations along said conveyor, these receiver stations being provided with means for releasably holding individual packing elements for reception of the respective product por-

tions collected in these stations.

4. A system according to claim 3, in which the receiver stations are provided with means for automatically exposing or supplying the packing elements from a magazine upon removal of a portion carrying packing element from the station.,

5. A system according to claim 3, in which the receiver stations are designed such that each packing element, when ready loaded with its product portion, is transferable to a working station next to the receiver area of the receiver station, e.g. by falling down into an underlying position, in which it is accessible for manipulation for orderly rearranging the products thereon concurrently with a new packing element being operative for receiving a new product portion.

6. A system according to claim 3, in particular for handling thin sliced products, in which system the means for selective diversion of the products from the sorting conveyor comprise diverter arms, which are laterally displaceable or pivotable across the conveyor, characterized in that the diverter arms are profiled with a lower, projecting scraper edge portion and an overlying projecting wall portion located slightly spaced above the conveyor, viz. only slightly more than corresponding to the thickness of the product slices.

7. A system according to claim 3, in which the receiver stations are provided with hopper shaped guiding walls of a plastics with a low friction coefficient.

8. A system according to claim 3, in which the receiver stations at the side of the sorter conveyor are provided with upstanding catcher plates arranged so as to converge outwardly from the conveyor side and located above lower support edge portions for opposed edge areas of the packing elements.

9. A system according to claim 8, in which the support edge portions are rigidly connected with up-

standing side wall portions and that means are provided for tilting the support edge portions downwardly for releasing the packing element resting thereon and for pivoting the upstanding side wall portions inwardly and downwardly in order to release products happening to stick thereto.

10. A system according to claim 8, in which the catcher plates are generally upwardly and inwardly slanting.

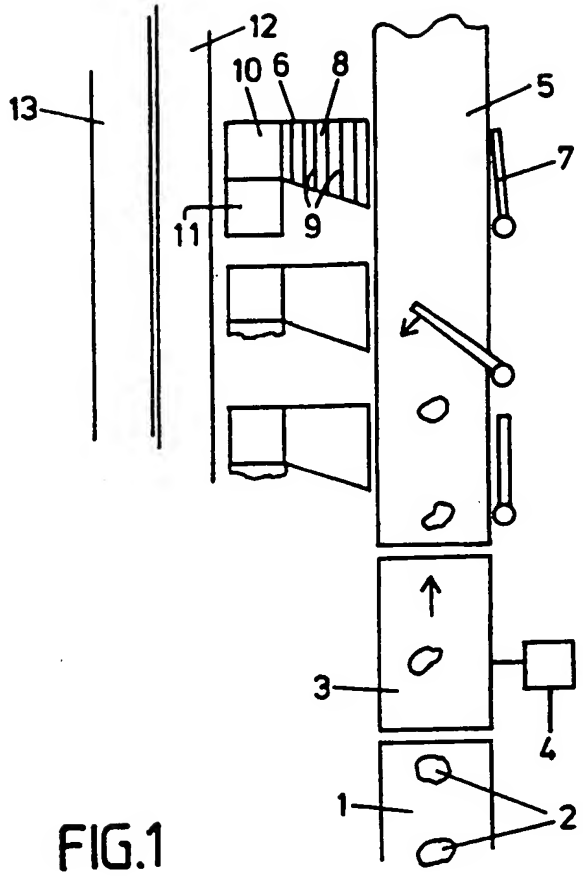

FIG.1

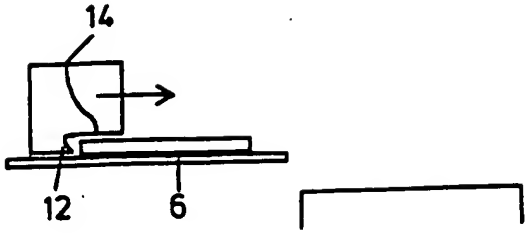

FIG.2

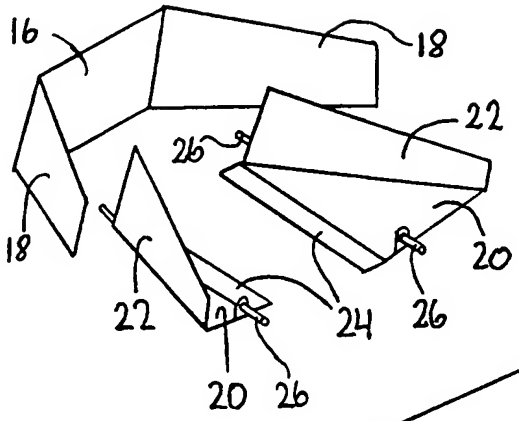

Fig. 3

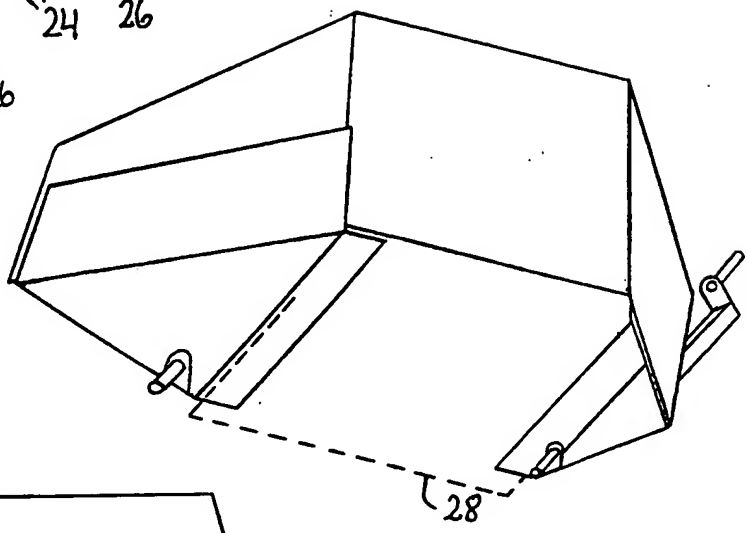

Fig. 4

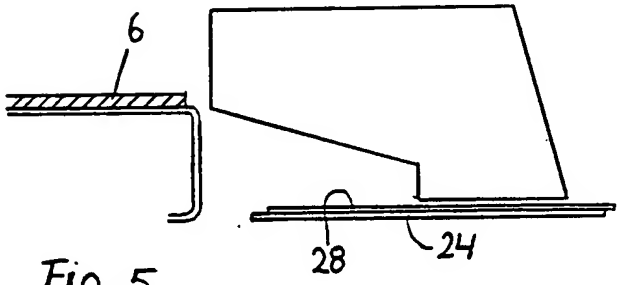

Fig. 5

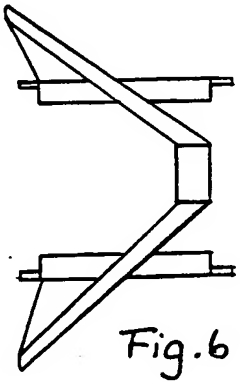

Fig. 6

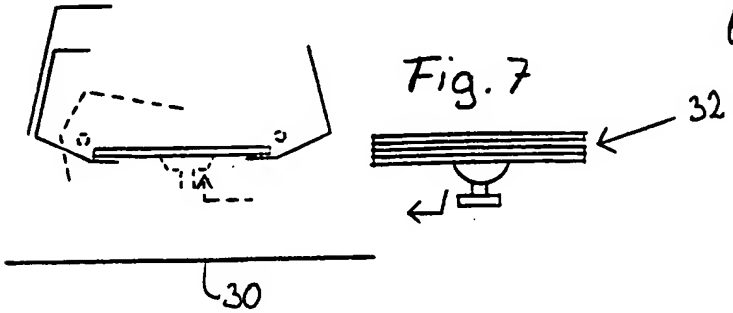

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 95/00124

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A22C 25/18, B07C 5/18, B65B 25/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A22C, B07C, B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

ORBIT: WPAT, USPM, JAPIO

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2116732 A (KNUD DALGAARD AND CO A/S), 28 Sept 1983 (28.09.83), page 2, line 8 - line 35, figure 1, claims 1-6	1,3
A	page 2, line 18 - line 25	6
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Y	US 3848757 A (JORDAN), 19 November 1974 (19.11.74), column 3, line 65 - column 5, line 14, figure 1	1,3
A		5
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A	DE 4215951 A1 (GEBA GERÄTEBAU GMBH), 18 November 1993 (18.11.93), figures 1,2, claims 1-3,10,14, abstract	1,3
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
7 July 1995	10 -07- 1995
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Petter Sörsdahl Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 95/00124

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3857488 A (LE CREN), 31 December 1974 (31.12.74), column 7, line 44 - column 8, line 34, figures 1,2	1,3
A	EP 0354009 A2 (A/S HUDE-CENTRALEN), 7 February 1990 (07.02.90), column 8, line 27 - column 10, line 12, figures 1,2, claim 1	1,3
A	EP 0284140 A1 (PERSOON), 28 Sept 1988 (28.09.88), figure 1, claim 1, abstract	1
A	DE 4215950 A1 (GEBA-GERÄTEBAU GMBH), 18 November 1993 (18.11.93), figure 1, claims 1,10	3,6
A	WO 8401762 A1 (SVENSKA AB IVERS LEE), 10 May 1984 (10.05.84), page 3, line 34 - page 4, line 32, figure 1	4,5
A	FR 2679201 A1 (LE GOFF), 22 January 1993 (22.01.93), page 2, line 1 - line 15, figures 1,3a	4,5

INTERNATIONAL SEARCH REPORT

Information on patent family members

29/05/95

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